

Amendments to the Drawings

The attached sheet of drawings includes changes to Figure 1. This sheet, which includes Figure 1, replaces the original drawing sheet including Figure 1.

Attachment: replacement sheet(s)

Remarks and Arguments

Claims 1-34 were presented for examination. Claims 1, 12 and 22-24 have been amended.

The drawings have been objected to because Figure 1 shows a component with reference numeral "23" to which the present specification does not refer. In response, the examiner's attention is directed to the specification at page 3, line 3, which refers to the reference numeral "23." Since the present specification does refer to the reference numeral "23", the objection to Figure 1 of the drawing for this reason and the corresponding objection to the specification are hereby respectfully traversed.

Figure 1 has also been objected to because it depicts a dotted box to which the specification does not refer. In response, an amended Figure 1 is attached with the dotted box removed.

Claims 1-11 and 22-34 have been rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent Publication No. 2002/0190715A1 (Marek.) The examiner comments that the Marek reference discloses all of the claimed limitations.

The present invention relates to RF NMR coils which comprise both magnetic field generating elements and capacitive elements and in which coil failures are reduced by orienting the capacitive elements within the coil so as to minimize the incidence of coil arcing. Each coil generates a magnetic field in an active sample volume, and has a dielectric substrate upon which is deposited a conductive material. The conductive material forms a plurality of nested current carrying loops each of which has magnetic field generating elements and interdigital capacitor elements. In order to minimize the electric field in the sample volume, the magnetic field generating elements are arranged to form a substantially closed geometric path surrounding an inner region that lies adjacent to the active sample volume and the interdigital capacitive elements are in a region outside of this geometric path. To minimize arcing, the interdigital capacitor elements are oriented in a direction that is substantially parallel to the orientation of the magnetic field generating elements. This arrangement is illustrated in present Figure 2 which clearly shows the separation of the magnetic field generating elements and the capacitive elements.

The Marek reference discloses RF NMR coils which are comprised of planar sections having both magnetic field generating elements and interdigital capacitive elements that are oriented in a direction that is substantially parallel to the orientation of the magnetic field generating elements. However, in the planar sections disclosed in Marek, the magnetic generating elements and the capacitive elements are both part of the same closed geometric path, in particular, they are both sides of the same rectangular path. This is plainly shown in the embodiments illustrated in Marek, Figures 10a and 10b. In order to reduce the effects of the electric field produced by the capacitive elements in the NMR coil, the sections are arranged so that only the magnetic field generating elements are located adjacent the sample volume and the capacitive elements are located away from the sample volume, for example, as shown in Marek Figures 1-6. This arrangement has a disadvantage that the width of the NMR coil assembly is much larger than the width of the sample volume. Consequently, for a given magnet bore size, the sample volume is substantially limited.

The differences between the present invention and the coil shown in the Marek reference can be plainly seen by comparing Figure 2 of the present specification with Figures 10a and 10b of the Marek reference. These differences are recited in the amended claims. Claim 1 is illustrative. It recites, in lines 5-12, "...a conductive material ... forming a plurality of nested current carrying loops each of which has magnetic field generating elements and interdigital capacitor elements, the current carrying loops forming a substantially closed geometric path surrounding an inner region that lies adjacent to the active sample volume, wherein the magnetic field generating elements form part of the closed geometric path and substantially all of the interdigital capacitor elements are in a region outside the closed geometric path ..." Such an arrangement is clearly not disclosed in the Marek reference. Consequently, amended claim 1 patentably distinguishes over the cited reference.

Claims 2-11 are dependent, either directly or indirectly, on amended claim 1 and incorporate the limitations thereof. Consequently, they distinguish over the cited reference in the same manner as amended claim 1.

Independent claims 22 and 24 have been amended in a manner similar to amended claim 1 and therefore distinguish over the cited reference in the same manner

as amended claim 1. Claims 25-34 are dependent, either directly or indirectly, on amended claim 24 and incorporate the limitations thereof. Consequently, they distinguish over the cited reference in the same manner as amended claim 24.

Claim 23 originally recited "...wherein the magnetic field generating elements comprise electrical conductors that run substantially parallel to a major axis of the oblong shape and the interdigital capacitor elements comprise electrical conductors that run substantially parallel to said major axis of the oblong shape, and wherein substantially all of the interdigital capacitor elements are located farther from a center of the oblong shape than the magnetic field generating elements." The examiner found that this recitation read onto the Marek reference because the recited "center of the oblong shape" lacked a frame of reference. In response, claim 23 has been amended along the lines of amended claim 1 and now recites, in lines 7-16, "...the current carrying loops forming a substantially closed geometric path surrounding an inner region that has a substantially oblong shape and lies adjacent to the active sample volume, wherein the magnetic field generating elements comprise electrical conductors that run substantially parallel to a major axis of the oblong shape and form part of the closed geometric path and the interdigital capacitor elements comprise electrical conductors that run substantially parallel to said major axis of the oblong shape, and wherein substantially all of the interdigital capacitor elements are located in a region outside the closed geometric path." Thus, amended claim 23 patentably distinguishes over the cited reference in the same manner as amended claim 1.

Claims 1-11 and 22-34 have been rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,727,700 (Marek '700.) As the examiner notes the Marek '700 patent issued from the Marek published application no. 2002/0190715 that is discussed above. Accordingly, the arguments presented above also apply to this reference.

Claims 12-21 have been rejected under 35 U.S.C. §103(a) as obvious over the Marek reference in view of applicant's specification. The examiner comments that Marek discloses all of the claimed limitations except that it does not state that the interdigital capacitor elements are oriented such that the square of the peak electric field in the direction of the static magnetic field is less than 10% of the peak of the sum of the

squares of the electric field components in each of the two perpendicular directions. However, the examiner argues that the orientation of the magnetic field producing elements in Marek must intrinsically produce the recited effect because applicant's specification states that the effect is produced when the capacitive elements are oriented parallel to the static magnetic field as they are in Marek.

Independent claim 12 has been amended in a manner similar to amended claim 1 and therefore distinguishes over the cited reference in the same manner as amended claim 1. Claims 13-21 are dependent, either directly or indirectly, on amended claim 12 and incorporate the limitations thereof. Consequently, they distinguish over the cited reference in the same manner as amended claim 12.

Claims 12-21 have been rejected under 35 U.S.C. §103(1) as obvious over U.S. the Marek '700 patent in view of applicant's specification. As the examiner notes the Marek '700 patent issued from the Marek published application no. 2002/0190715 that is discussed above with respect to a similar rejection. Accordingly, the arguments presented above also apply to this reference.

In light of the forgoing amendments and remarks, this application is now believed in condition for allowance and a notice of allowance is earnestly solicited. If the examiner has any further questions regarding this amendment, she is invited to call applicants' attorney at the number listed below. The examiner is hereby authorized to charge any fees or direct any payment under 37 C.F.R. §§1.17, 1.16 to Deposit Account number 50-3969.

Respectfully submitted

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